



United States Department of Energy
Nuclear Criticality Safety Program (NCSP)

2-Week Nuclear Criticality Safety Hands-On Training Course

Student Information Booklet

Fiscal Year 2016



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Quick-Start Guide

Use this section to quickly find the information you need for a particular location for the 2-week Hands-On course. This will provide you with quick access to the location of the course and the necessary logistical information about the course.

1st Week Portion of the Hands-On Course (Click on the applicable link)

- [National Atomic Testing Museum](#)
- [Nevada Support Facility/Nevada Field Office](#)

2nd Week Portion of the Hands-On Course (Click on the applicable link)

- [Sandia National Laboratory](#)
- [National Critical Experiment Research Facility at the Device Assembly Facility, Nevada National Security Site](#)

Course Description

The Nuclear Criticality Safety Program's (NCSP) class has been designed for new Nuclear Criticality Safety (NCS) professionals with a background in Nuclear Engineering, Physics, Mathematics, or some other technical field. The purpose of this course is to provide an experimental hands-on training experience addressing important characteristics of neutron-multiplying systems, which will include:

- Discussion of the theory and implications for safety of fissionable material operations;
- Providing awareness and understanding of DOE mandates developed specifically for criticality safety professionals (CSPs), regarding application of DOE Orders, Guides, Rules, and ANS standards in performance of criticality safety evaluations that meet DOE standards and hazards analysis methods and about NCS control implementation and maintenance.

The course is comprised of a week-long classroom training in Las Vegas, Nevada at either the National Atomic Testing Museum (NATM) or the Nevada Field Office (NFO)/Nevada Support Facility (NSF), and then immediately followed by a second week of hands-on training at the National Critical Experiment Research Center (NCERC)/Device Assembly Facility (DAF) or Sandia National Laboratory (SNL). Students must attend the courses during two consecutive weeks, i.e., attending the second week of hands-on training at a later offering is not allowed.

The first week is offered in Las Vegas Nevada at either the NATM or the NFO/NSF,, and focuses on the following:

- Characteristics of a neutron-multiplying system in term of parameters important to criticality safety such as mass, moderation, interaction, reflection, geometry, etc.;
- ANSI/ANS-8 series standards (primarily ANSI/ANS-8.1) as they relate to preparing nuclear criticality safety evaluations (NCSEs) that meet DOE standards;
- DOE Orders, DOE Rules, DOE Standards, and DOE Guides that are used in the development of NCSEs;
- Evaluation process with respect to roles and responsibilities, conducting effective walk downs, defining normal and credible abnormal conditions, etc.;
- Past process criticality accidents and understanding the root cause and lessons learned from them;
- The role human factors and equipment reliability play in operations with fissionable materials outside of reactors;
- Methods and techniques used to perform non-destructive analyses (NDA) and the significance of NDA with regards to preparing accurate NCSEs;
- Selection criteria to identify applicable benchmarks for computational tool and data validation and determining bias and uncertainty to establish subcritical limits;
- Determining, implementing and maintaining proper NCS controls for safe operations.

The second week of the course is offered at either the NCERC/DAF or at SNL focus on the following:

- Learning neutron detection equipment and techniques;
- Reviewing past critical experiment accidents and understanding the root cause and lessons learned from them;

- Identifying the regulations and safety rules governing the conduct of subcritical and critical experiments;
- Observing and/or participating in experimental demonstrations of many of the criticality safety parameters, such as mass, moderation, spacing, reflection, and strong neutron absorbers for subcritical and near critical neutron-multiplying systems, as well as time behavior of critical and delayed supercritical neutron multiplying systems;
- Calculating subcritical multiplication based on experimental data and interpretation of multiplication curves.

A course flier for the 2-week hands-on course can be downloaded from this location:

http://ncsp.llnl.gov/HS3201/TEP-flyer_for_website-2_week_course_8-24-15.pdf.

A diverse team of instructors, experimenters, and coordinators participate in the conduct of these courses. Individuals from Oak Ridge National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratory, National Nuclear Security Administration, Los Alamos National Laboratory, and National Security Technologies, LLC, currently participate in the course planning and execution.

Course Schedule

Week 1 – The first week of classroom training will be offered at either the NATM or the NFO/NSF. Course logistics will be provided via email from the course registration point-of-contact. The course will be taught Monday through Friday from about 8:00 am to 5:00 pm.

Week 2 – The second week of hands-on training with critical assemblies will depend upon your registration choice and clearance level. L- and Q-cleared students can attend the SNL Hands-on course located at Technical Area 5 at SNL. Q-cleared students can attend the Hands-on Training at the NCERC/DAF at the Nevada Nuclear Security Site (NNSS), located approximately 65 miles from Las Vegas, NV. Both courses will be offered the second week Monday through Friday from about 8:00 am to 5:00 pm.

Course Content

The course content is provided below for the classroom training provided the first week.

NATM or NFO/NSF Classroom Training (Week 1)

- DOE Requirements and Guides and an overview of the Nuclear Criticality Safety Program
- Criticality accident lessons learned and overview of first and last process criticality accidents
- Nuclear criticality safety fundamentals
- ANSI/ANS series 8 standards
- NCS evaluation requirements overview and evaluation workshops
- Importance of human factors for NCS evaluation development and linkage to process accident discussion
- Importance of Non-destructive assay (NDA) measurements for NCS evaluations and NDA methods overview
- Hand calculation methods
- Validation

NCERC/DAF Hands-On Training (Week 2)

- Experimental methodology introduction
- Training Assembly for Criticality Safety (TACS) experimental methodology
- TACS subcritical experiments
- Overview of reactor physics
- Planet subcritical hand-stacking experimental methodology
- Planet Hands-on operations and approach to critical and critical operations
- Advanced hands-on demonstration with the BeRP ball and the Np sphere
- Flattop critical operations
- Godiva IV critical assembly demonstration
- Review of experimental criticality accidents
- International Criticality Safety Benchmark Evaluation Project (ICSBEP) overview

SNL Hands-On Training (Week 2)

- Review of NCS fundamentals and criticality parameter
- Experiment bases for NCS
- Discussion of experimental criticality accidents
- Subcritical multiplication
- Conduct of operations
- Nuclear instrumentation
- Reactor kinetics
- Nuclear criticality safety data and limits
- Overview of the ICSBEP
- ANSI/ANS-1 operations
- Light water reactor design and fuel paradigms
- Fuel depletion and burnup
- Design of the 7uPCX critical experiments
- Experiment 1-3 – Approach to critical on fuel loading, moderator height and fuel separation
- Experiment 4 – Interior fuel rod removal

Completion Requirements

Attendees must complete the 1ST week classroom training at either NATM or NFO/NFS and pass an exam at the end of the course with a grade of 80% or better. Attendees must also complete and pass the 2nd week of the hands-on course at SNL or NCERC/DAF with a grade of 80% or better. Certificates for successful completion of the course (1 certificate for the entire two week-long course) will be mailed to students after the course is completed. Participation is expected from all course attendees. Arrive on time and participate in class exercises to obtain all participation points. **PLEASE DO NOT PLAN TO LEAVE EARLY, OR YOU WILL NOT RECEIVE A CERTIFICATE.**

Students can also provide feedback on all aspects of the course, including content, instructors, classroom characteristics, etc. Feedback is provided to the Course Coordinator who oversees student feedback resolution with the course points-of-contact.

Course Points-of-Contact

Contact information for the 2-week course is listed in the table below. Pre-course questions should be directed to Doug Bowen and Becka Hudson. Questions during the course can also be directed to Doug, Becka or the course site points of contact.

Doug Bowen Course Coordinator	(505) 500-7686 (cell) (865) 576-0315 (office)	bowendg@ornl.gov
Becka Hudson Registration Point-of-Contact	(925) 422-6392 (office)	HUDSON14@llnl.gov
Charlotte Carter NFO/NSF Point-of-Contact	(702) 290-1501 (cell) (702) 295-0188 (office)	carterc@nv.doe.gov
Lori Scott NATM and NFO/NSF Classroom Training Point-of-Contact	(724) 787-0911	lorisc0tt@aol.com
Mary Ellen Ratzner SNL Class Point-of-Contact	(505) 844-2474	meratze@sandia.gov
Catherine Percher NCERC/DAF Class Point-of-Contact	(925) 423-9345	percher1@llnl.gov

Prerequisites

This class has been designed for new Nuclear Criticality Safety practitioners with a technical background in Nuclear Engineering, Physics, Mathematics, or some other technical field.

NATM or NFO/NSF Classroom Training Prerequisites (Week 1)

(Required for those attending either the NATM or the NFO/NSF)

The student is expected to have reviewed the following information prior to coming to the classroom portion of the hands-on course.

- Review and be familiar with all NCSet modules. They can be downloaded from the following link on the NCSP website – <http://ncsp.llnl.gov/trainingMain.html>.

These training materials have been developed for the criticality safety user community. Feedback from the users is important so that new modules can be designed and current modules improved to maximize their benefit to the largest possible audience.

- Module 1: Introductory Nuclear Criticality Physics
- Module 2: Neutron Interactions
- Module 3: The Fission Chain Reaction
- Module 4: Neutron Scattering and Moderation
- Module 5: Criticality Safety Limits
- Module 6: Introduction to Diffusion Theory
- Module 7: Introduction to the Monte Carlo Method
- Module 8: Hand Calculation Methods – Part 1
- Multimedia Module: Buckling Conversion Method
- Multimedia Module: Surface Density Method
- Module 9: Hand Calculation Methods – Part 2

- Module10: Criticality Safety in Material Processing Operations – Part 1
 - Module 11: Criticality Safety in Material Processing Operations – Part 2
 - Module 12: Preparation of Nuclear Criticality Safety Evaluations
 - Module13: Measurement and Development of Cross Section Sets
 - Module14: A Review of Criticality Accidents by Thomas McLaughlin (video)
 - Module15: Fundamentals of Criticality Safety for Non-material Handlers
 - Module16: Burnup Credit for Criticality Safety Analysis of Commercial Spent Nuclear Fuel
- Become familiar with the following NCS handbooks. The handbooks can be downloaded from the following link on the NCSP website – <http://ncsp.llnl.gov/ncsinfoMain.html>.
 - ARH-600, Electronic Handbook (Hanford)
 - LA-10860-MS, Critical Dimensions of Systems Containing ²³⁵U, ²³⁹Pu, and ²³³U, 1986 Revision
 - LA-12808, Nuclear Safety Guide
 - LA-13638, A Review of Criticality Accidents: 2000 Revision
 - LA-14244-TM, Hand Calculation Methods for Criticality Safety – A Primer
 - LA-11627-MS, Glossary of Nuclear Criticality Terms
 - LA-3366, Criticality Control in Operations with Fissile Material

SNL Hands-on Training Prerequisites (Week 2)

(Required for those attending the 2nd week at SNL)

Prior to obtaining unescorted access to TA-V at SNL, the students must complete the following training modules prior to the course. Please submit the following information as soon as possible for processing.

- **ESH-100** – Please click on the URL link to open the following attachment, which contains both the course materials and the test.

➤ <http://ncsp.llnl.gov/HS3201/ESH100.pdf>

When you have completed reviewing the material and completed taking the test, print page 36 and fill in the information requested on the answer sheet:

- You are a visitor (where your org is requested)
 - The SNL Training Coordinator providing this material is Mary Ellen Ratzer, SNL Org. 1382.
 - Scan and email the completed test and feedback form to ESH100 Course Manager, Debra Maestas (dcmaest@sandia.gov) or fax to her at (505) 844-2748.
- **RAD102** – Please read the following document. The exam is found at the end of the document, pages 36-40. Please print these five pages, fill in your name and the required project task number (130493/09.02), complete the exam and either scan the exam and email to Tracy Armijo (tdarmij@sanda.gov) or fax to Tracy Armijo at (505) 844-2748.
 - <http://ncsp.llnl.gov/HS3201/Rad102a.pdf>
 - **Hazard, Emergency and Response Training (HEART)** – (Not done before the course) A video will be shown early on the first day of the class to present this training information. A short quiz will be provided afterward.

NCERC/DAF Hands-on Training Prerequisites (Week 2)

(Required for those attending the 2nd week at NCERC/DAF)

The NCERC/DAF hands-on training class requires students to handle significant quantities of fissionable material to participate in the hands-on portions of the class, e.g., Planet critical assembly uranium foil hand stacking, handling the plutonium BeRP ball, and Neptunium sphere. For many people, this is the first time they have ever held large quantities of uranium and plutonium. Unless you are a fissile material handler at your home site, you probably are not allowed to go into a facility and pick up fissile material. To come to the NNSS and handle our fissile material, we require that you have Radworker II training. Thus, each student is required to provide proof of Rad Worker II training with certificate of completion or training record. Currently, equivalency has been established for Radworker II for the following sites: LLNL, LANL, SNL, Pantex, Savannah River, PNNL, Y-12, ORNL, NFO/NFS, AMWTP Idaho, and INL. Send your proof of Rad Worker II training to Becka Hudson (HUDSON14@llnl.gov or fax 925-423-2854), so she can check/authorize equivalency and provide you with supplemental training (requires your signature), if needed.

Also, NNSS access requires NNSS Site Access Safety Orientation, NNSS General Employee Radiation Training, Desert Tortoise Conservation Training, and Emergency Management Training (or a visitor briefing) prior to the course.

- <http://www2.nstec.com/Pages/Training/TrainingHome.aspx>

Site Specific Information

NATM Classroom Training Logistics

The classroom portion of the 2-week Hands-on Course is offered at one of two locations: the NATM and the NFO/NSF. The NFO/NSF requires personnel security preparations but the NATM does not.

Location

The address of the NATM is 755 E. Flamingo Rd., Las Vegas, NV 89119. The phone number for the NATM is (702) 794-5151. Information about the NATM can be found at the following website address: <http://nationalatomictestingmuseum.org/>.

Badge Information

You will not need your badge for the classroom portion of the 2-week Hands-on Course when it is offered at the NATM; however, please bring it with you for NCERC/DAF badge office processing – you will need your badge for the second week of the 2-week Hands-on Course (at either SNL or NCERC/DAF).

You will need a current HSPD-12 badge (the new federal credential – see example figure below) with a working magnetic strip (on the back) and gold chip (on the front). Contact your badge office if you have any questions about the functionality of your badge. You should test your badge to make sure that both of these functions are working before coming to the NCERC/DAF class. If you do not have an HSPD-12 badge, or your badge does not work, you will need to transfer your clearance and get a temporary site badge issued to you. Please contact your security office to fill out the paperwork, and let Becka Hudson ((925) 422-6392, hudson14@llnl.gov) know as soon as possible.



What an HSPD-12 Badge Looks Like

Cell Phones

Cell phones, even those with cameras, are allowed.

Prohibited Articles

None. Of course, as with all DOE sites, illicit drugs, explosives, and firearms are prohibited.

Flight Information

The closest airport is Las Vegas McCarran International Airport (airport code LAS). You will need to fly in on Sunday (the day before the course starts) as the course will begin early on Monday morning. Do not plan to fly home until Friday evening or Saturday, since Friday's course could last until 2:00-3:00 pm.

Rental Car Information

A rental car is a must for attendance at the class. Most hotels in Las Vegas provide free parking (some provide free valet).

Lodging Information

Las Vegas

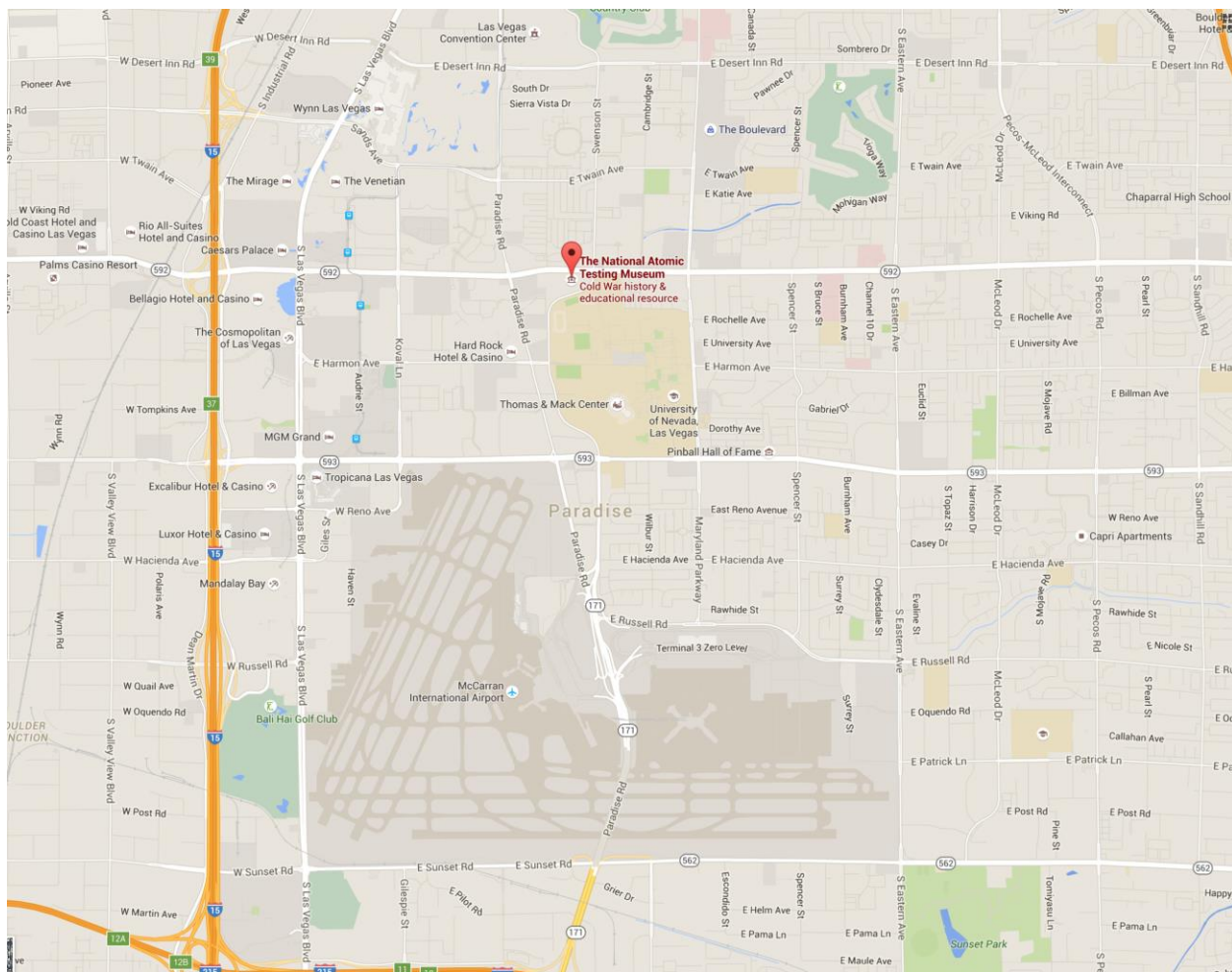
Las Vegas is usually the lodging location of choice for visitors. There are a plethora of hotels, entertainment, and dining options to choose from in Las Vegas. Many of the hotels offer rates below per diem (currently for FY2016 at \$99), although some do charge add-on “resort fees” (up to \$25/day), which may or may not be reimbursable by your travel department if they cause your lodging to be over per diem. The website www.vegas.com will allow you to easily compare rates at hotels in Las Vegas. Note that these rates DO NOT include the resort fees.

The NATM located off the Las Vegas strip just north of the McCarran Airport – see the map below.

Daily Logistics

Students are to meet at the NATM no later than 8:00 am prepared to begin the course. The course will last until 5:00 pm each day. The course will be held in a standard classroom environment. No lunch will be provided, and the lunch break will be from 12:00-1:00 pm each day. A brief review session and quiz will be administered at the end of each day. A course examination will be administered late morning on Friday, and the course should be completed by 1:00 pm.

Map Showing the Location of the NATM in Las Vegas, NV



Map of the Location of the NATM

NFO/NSF Classroom Training Logistics

The classroom portion of the 2-week Hands-on Course is offered at one of two locations: The NATM and the NFO/NSF. The NFO/NSF requires personnel security preparations but the NATM does not.

Location

The address of the NFO/NSF is 232 Energy Way, Las Vegas, Nevada.

Badge Information

You will need a current HSPD-12 badge (the new federal credential) with a working magnetic strip (on the back) and gold chip (on the front). Contact your badge office if you have any questions about the functionality of your badge. You should test your badge to make sure that both of these functions are working before coming to the NCERC/DAF class. If you do not have an HSPD-12 badge, or your badge does not work, you will need to transfer your clearance and get a temporary site badge issued to you.

Please contact your security office to fill out the paperwork, and let Becka Hudson ((925) 422-6392, HUDSON14@llnl.gov) know as soon as possible.

Cell Phones

Cell phones, even those with cameras, are allowed. However, no cell phones are allowed in cleared buildings or areas. Please leave cell phones in your car.

Prohibited Articles

Personal cameras (besides those in cell phones) are not allowed. You CANNOT use a camera to take photographs.

As with all DOE sites, illicit drugs, explosives, and firearms are prohibited.

Flight Information

The closest airport is Las Vegas McCarran International Airport (airport code LAS). You will need to fly in on Sunday (the day before the course starts) as the course will begin early on Monday morning. Do not plan to fly home until Saturday or Friday evening, since Friday's course could last until 2:00-3:00 pm.

Rental Car Information

A rental car is a must for attendance at the class. Most hotels in Las Vegas provide free parking (some provide free valet).

Lodging Information

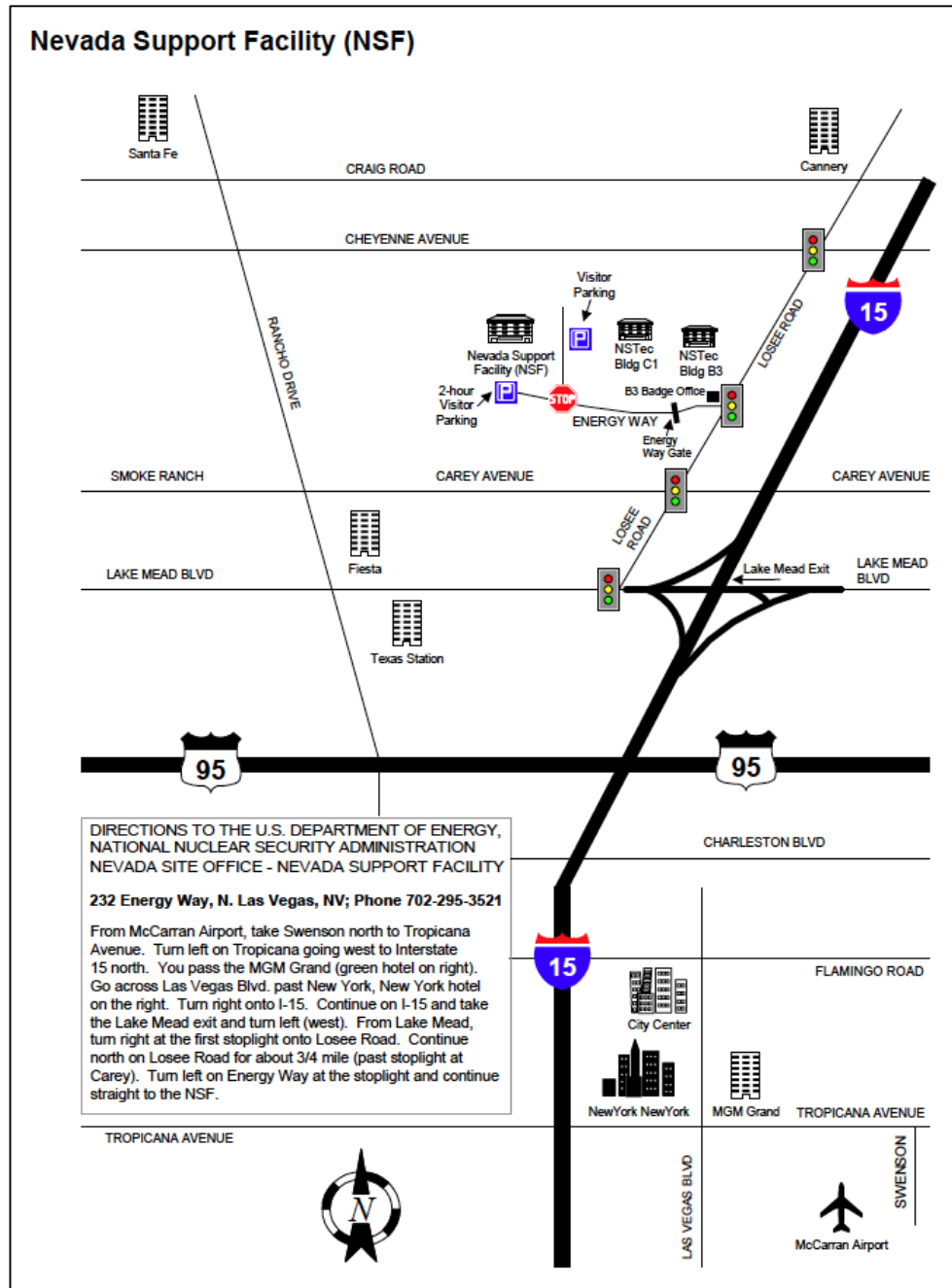
Las Vegas

Las Vegas is usually the lodging location of choice for visitors. There are a plethora of hotels, entertainment, and dining options to choose from in Las Vegas. Many of the hotels offer rates below per diem (currently for FY2016 at \$99), although some do charge add-on "resort fees" (up to \$25/day) which may or may not be reimbursable by your travel department if they cause your lodging to be over per diem. The website www.vegas.com will allow you to easily compare rates at hotels in Las Vegas. Note that these rates DO NOT include the resort fees.

North Las Vegas

North Las Vegas has many chain hotels (Marriott, Hampton Inn, La Quinta, etc). A popular hotel/casino with many NFO/NSF regular visitors is the J.W. Marriott located on Summerlin Parkway. They do not charge resort fees and will typically offer government rate through their website or by phone reservation.

Map Showing the Location of the NFO/NSF in North Las Vegas, NV



Location of the NFO/NSF in North Las Vegas, NV

SNL Hands-on Training Logistics

Meeting Location for Badge Enrollment

If your badge has not been enrolled in the SNL system, you **MUST** go to IPOC (Innovation Parkway Office Complex) on the first day. (From the Airport, take I-25 north to I-40 east to the Eubank exit. Turn right [south] to the end of Eubank – where Eubank makes a bend to the right [west] just before the base gate. Turn left on Innovation Pkwy, the light just before the gate. The road bends left [east] and then you turn left [north] into the lot in front of the building. Look for the sign for the SNL Badge Office.) IPOC is located southeast of the Eubank gate. See the map at the end of this document for details on getting to the badge office. The badge office opens at 7:15 am. You will request to have your DOE badge put into the SNL system. You will be asked to supply a 4-digit code in order to swipe your badge for access into limited areas.

Mary Ellen Ratzer will meet you at IPOC at 7:15 am to assist with this process.

We will then proceed to the Eubank gate. Your DOE badge will get you through the gate. Take it out of the holder and pass it to the guard. They may check ID for everyone in the vehicle so be prepared if you have riders. The second map in this document shows you how to get to TA-V. Once you are on Pennsylvania street, proceed until you see the sign to Tech Areas 3 and 5. Turn right there and proceed to TA-V. The parking lot is just beyond the main double-fenced area. For those so equipped, the lat./lon. of the parking lot is 34 deg 59.959' -106 deg 32.247'. Building 6577 is east of the parking lot outside the fence. See the TA-V map (below) for details on where to park and how to get to the training building.

When we are at the critical experiment facility, we will be in a Limited Area, which requires an L or Q clearance for unescorted access. The emergency plan at the reactor facilities also requires that anyone who has not been trained on emergency response for TA-V be escorted for safety reasons while in TA-V. One of the first things we will do after your arrival will be to provide that area access training so you can have unrestricted access to TA-V.

Prohibited items at SNL

As described above, during the class, we will be in a Limited Area (LA). As at all U.S. Department of Energy facilities, each area has a long list of items that are not allowed with the LA being the most restricted. Examples of prohibited items are listed below. Please be aware that **upon entering or leaving SNL premises, all personnel are subject to search of their persons, hand-carried items, and vehicles.**

Items that are ALWAYS prohibited at SNL:

- Firearms
- Explosives, pyrotechnics, propellants
- Illegal drugs & paraphernalia, intoxicants
- Other items prohibited by law

Examples of items prohibited in the Limited Area (e.g. during our operations at the critical experiments):

- Personally-owned electronic equipment
- Radio frequency transmitting equipment including Bluetooth devices, WiFi devices, and pagers with transmitters
- Recording equipment (audio, video, data)
- Computers and peripherals
- Removable computer media
- Cell phones or other cellular network devices
- Portable electronics including hand-held computing devices
- Non-SNL owned devices

There is a lock box just inside the front door of Building 6577 that you can use.

Lodging and Dining in Albuquerque

SNL is located on Kirkland Air Force Base a few miles from the Albuquerque International Airport. A wide variety of hotels are available very close to the laboratory. The following website has recommendations for lodging and dining options in Albuquerque, NM:

<http://www.itsatrip.org/lodging/default.aspx>.

Daily Logistics

We want you as a student to have the most “hands-on” laboratory time as possible and to have a great educational experience. Since our experimental facility is fairly remote, the days will be accordingly long. Even though the morning start times are early, **please arrive on time each day**.

Monday

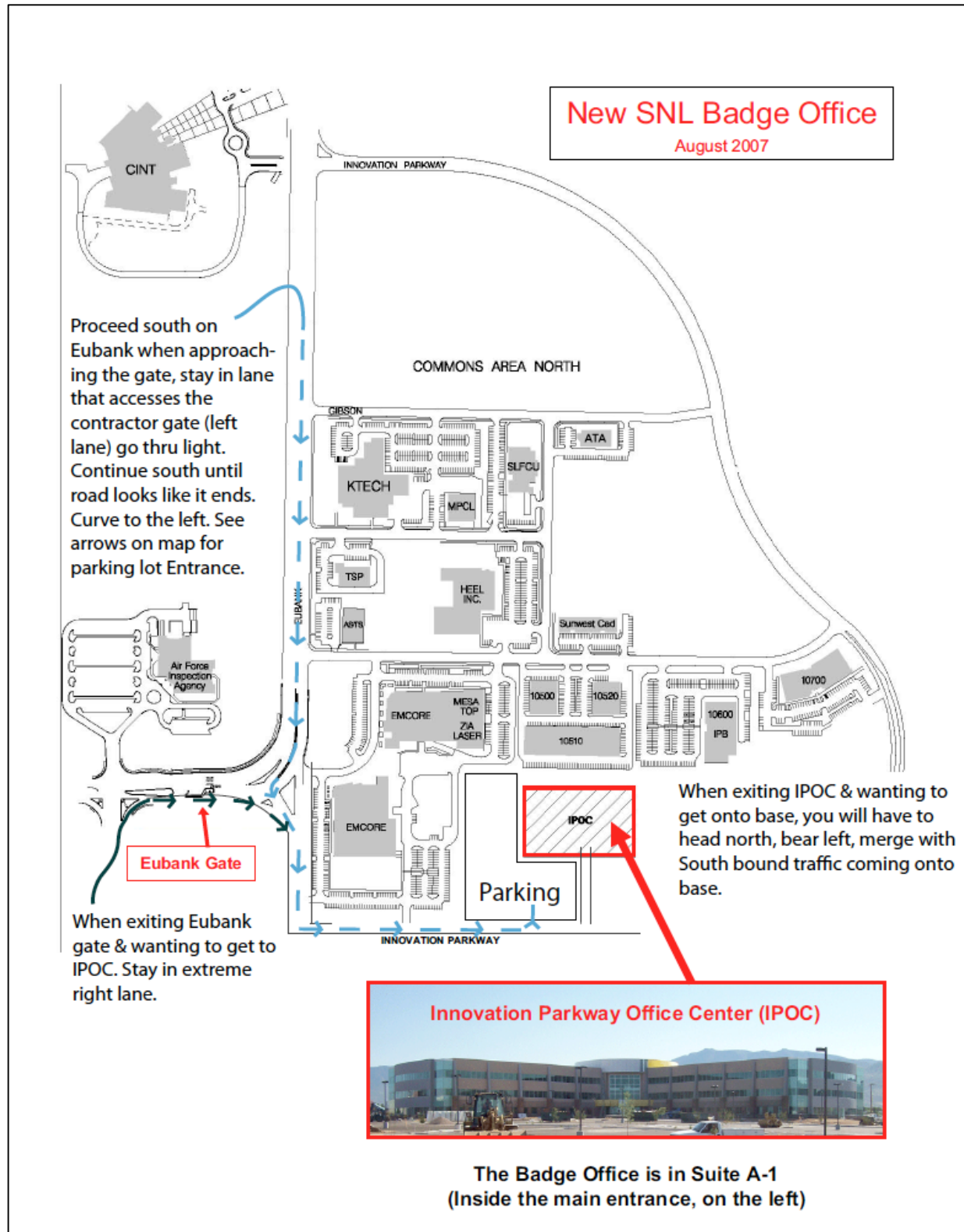
Meet Mary Ellen Ratzer at the Sandia Badge Office at 7:15 am on Monday morning. The class will begin once all participants arrive at the TA-V classroom. Lunch will be on your own. Sodas, and occasionally, snacks are provided by the Sandia staff. The course points of contact will mention the various options for lunch. Class will be conducted until about 5:00 pm.

Tuesday, Wednesday, and Thursday

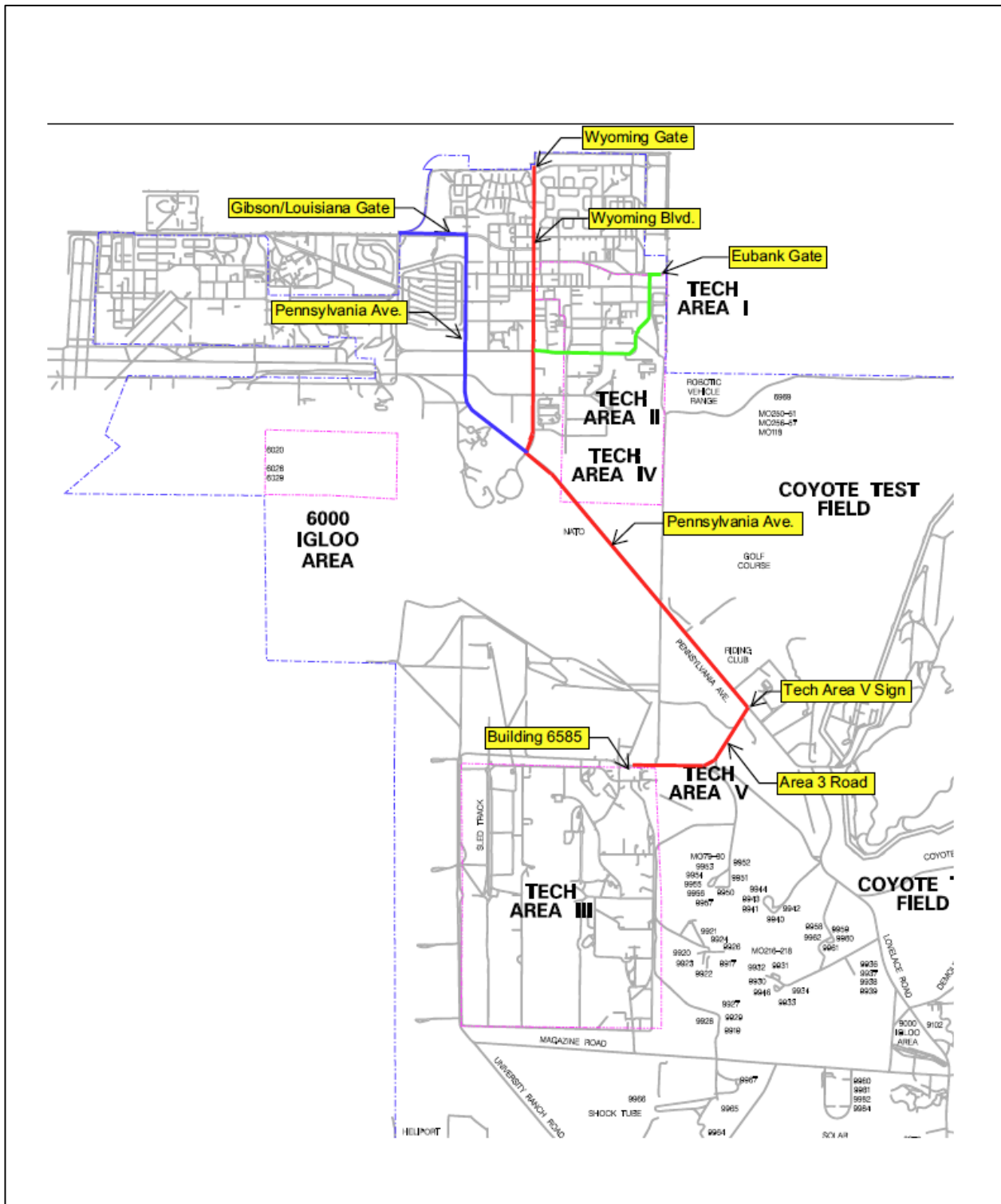
Experiments and lectures will be performed all day on Tuesday, Wednesday, and Thursday at the TA-V. We will meet at 8:00 am in the same classroom where we met on Monday. Lunch will be one your own. Class will be conducted until about 5:00 pm.

Friday

Lectures and experiments will be completed Friday morning. A brief review session will be provided by the Sandia instructors and the course examination will be administered. The course should end no later than 1:00 pm on Friday. Do not plan to fly home until Friday evening or Saturday, since Friday’s course could last up until 2:00-3:00 pm.

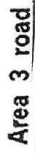


Directions to the SNL Badge Office



Getting to Tech Area V from all Kirtland AFB Gates

Area 5



SNL Technical Area 5 Map

NCERC/DAF Hands-on Training Logistics

Location

NCERC/DAF is located on the NNSS. The NNSS is a DOE site, approximately the size of Rhode Island, located 65 miles northwest of Las Vegas, NV. The main base camp is Mercury, Nevada (searchable on Google maps).

On Friday, we will be meeting in Las Vegas at either the NATM or the NFO/NFS.

Cell Phones and the NNSS

Cell phones, even those with cameras, are allowed on the NNSS. However, no cell phones are allowed in NCERC/DAF. Please leave cell phones in your car.

Prohibited Articles

Personal cameras (besides those in cell phones) are not allowed on the NNSS. You CANNOT use a camera to take photographs on the NNSS.

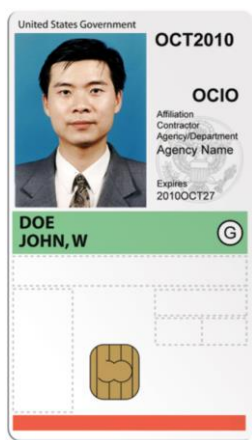
As with all DOE sites, illicit drugs, explosives, and firearms are prohibited.

Information on Things to Bring

- Your badge! If you forget your badge, you might miss out on a day or more of the class.
- A lunch for our experimental days (Monday, Tuesday, Wednesday, and Thursday)
- Money or credit card for lunch on Friday
- A calculator or laptop with spreadsheet software for homework (please leave in your car if you bring it onsite)

Badge Information

You will need a current HSPD-12 badge (the new federal credential – see example figure below) with a working magnetic strip (on the back) and gold chip (on the front). Contact your badge office if you have any questions about the functionality of your badge. You should test your badge to make sure that both of these functions are working before coming to the NCERC/DAF class. If you do not have an HSPD-12 badge, or your badge does not work, you will need to transfer your clearance and get a temporary site badge issued to you. Please contact your security office to fill out the paperwork, and let Becka Hudson ((925) 422-6392, HUDSON14@llnl.gov) know as soon as possible.



What an HSPD-12 Badge Looks Like

Dress Code

We will be in the lab Monday through Thursday. You need to wear long pants and sturdy shoes (tennis shoes, boots, or leather shoes) on lab days. If you have your own safety glasses with side shields, you may want to bring them for lab days.

If you are attending a class in the winter, the NNSS can be VERY cold in the early morning. Please make sure you bring a jacket.

Flight Information

The closest airport is Las Vegas McCarran International Airport (airport code LAS). You will need to fly in on Sunday (the day before the course starts) as the course will begin early on Monday morning. The course will conclude around 3:00 pm on Friday. However, given travel time to the airport, rental car drop off, etc., the earliest time you want to reserve a return flight on Friday would be 6:00 pm.

Rental Car Information

A rental car is a must for attendance at the class. The NNSS is far from Las Vegas and you will need to drive. Most hotels in Las Vegas provide free parking (some provide free valet).

Driving on the Site

The NNSS has many interesting sites scattered throughout the desert, but as a visitor, you are not allowed to drive around site seeing. Please only drive on the Mercury highway to and from NCERC/DAF. Do not attempt to drive off-road, and do not pick up anything on the site to take for a souvenir.

You can be pulled over for speeding on the site. Obey all speed limits.

Driving Tips

The commute to and from the site will be long (see notes under “Lodging Information” for approximate travel times). There is spotty radio coverage on US-95, so you might want to bring CDs or an mp3 player and an auxiliary cable, especially for the early morning/late evening drives. Satellite radio is an option for your rental car, but is usually not a reimbursable additional expense for government travel. After the first day, you might consider car-pooling with your fellow students.

*******NOTE:** You will go through gasoline VERY quickly with a 150+ mile (round-trip) commute each day. There is NO gasoline available at the NNSS and the gas stations are few and far between on US-95. Keep an eye on your fuel levels!

*******NOTE:** Indian Springs is a small town (and one of the few gas station locations) you will have to pass through on your drive from Las Vegas to the site. This area is a HUGE speed trap, as you go from 70 mph down to **35 mph**. Many people visiting the NNSS have been pulled over for speeding here. Make sure you slow down when going through Indian Springs. On a brighter note, you will drive by Creech Air Force Base, home of both the predator drones and the Thunderbirds. If you’re lucky, you just might get a free airshow during your commute to the site.

Lodging Information

Las Vegas

Las Vegas is usually the lodging location of choice for visitors to the NNSS. There are a plethora of hotels, entertainment, and dining options to choose from in Las Vegas. Many of the hotels offer rates below per diem (currently for FY2015 at \$96), although some do charge add-on “resort fees” (up to

\$25/day) which may or may not be reimbursable by your travel department if they cause your lodging to be over per diem. The website www.vegas.com will allow you to easily compare rates at hotels in Las Vegas. Note that these rates DO NOT include the resort fees.

******NOTE:** If you choose to stay on the Strip (Las Vegas Blvd), be aware that your travel time to Mercury is approximately 75 minutes (early morning, no traffic). Your travel time to NCERC/DAF (Wednesday and Thursday mornings) from the Strip is approximately 100 minutes.

North Las Vegas

North Las Vegas is another option for lodging near NNSS. It is approximately 10 miles closer to the site than on the Strip and has many chain hotels (Marriott, Hampton Inn, La Quinta, etc). A popular hotel/casino with many NNSS regular visitors is the J.W. Marriott located on Summerlin Parkway. They do not charge resort fees and will typically offer government rate through their website or by phone reservation.

******NOTE:** If you choose to stay in North Las Vegas, be aware that your travel time to Mercury is approximately 65 minutes (early morning, no traffic). Your travel time to NCERC/DAF (Wednesday and Thursday mornings) is approximately 90 minutes.

Mercury Dorms

The NNSS does have dorm rooms available in Mercury. The rooms are standard motel-type rooms with internet access and cable TV. The Mercury cafeteria is the only option on-site for dining. With your badge, you can freely leave the site 24 hours a day. Emergency medical services are also available. Rooms are \$40 per night. The dorms can be booked by contacting Cindy Farinholt by email at cfarinholt@lanl.gov.

The dorms are located in Mercury and are a 30-minute drive from NCERC/DAF.

Dosimeters and Radiation Doses

We will issue you a dosimeter on Monday morning. You must wear the dosimeter whenever you are in NCERC/DAF. It should be worn above the waist with the window facing outwards. You will leave the dosimeters at NCERC/DAF each night. We will collect the dosimeters on Thursday afternoon at the site. You will not need a dosimeter on Friday.

Radiation doses for the class are expected to be low. All critical experiments will be conducted in a shielded part of the facility to protect you from excessive doses. However, you will be handling fissile material, so you will receive some radiation dose. You will not receive more than 10 mrem during the entire week of the class, and your actual dose is likely to be much lower. At the end of the year, you will get a report of your dose from the NNSS contractor, NSTec, based on your dosimeter readings.

Daily Logistics

We want you as a student to have the most “hands-on” laboratory time as possible and to have a great educational experience. Since our experimental facility is fairly remote, the days will be accordingly long. Even though the morning start times are early, **please arrive on time each day**. If you do not arrive on time, we cannot guarantee that you will be able to participate in the day’s activities.

Monday

We will be meeting at the Mercury Badge Office at 7:00 am on Monday morning.

The badge office is located on Mercury highway (take the Mercury exit from US-95 N). The badge office will be on your right just before the guard/badge check station. You will need to get your badge encoded for access to NCERC/DAF (with a pin number) and enroll in biometrics.

After the badge office, drive through the guard station on Mercury highway (approximately 1/4 mile north of the badge office). Continue driving through Mercury Base Camp toward the "forward areas". The NCERC/DAF is a large, white building approximately 25 miles past Mercury that will be on your left. Unfortunately, the NCERC/DAF access road is not well marked, but the NCERC/DAF and guard shack are clearly visible from the Mercury highway. After you make the turn-off of Mercury highway to drive up to NCERC/DAF, you will pass through a guard check. The guard will want you to turn off your vehicle, release the trunk, and the driver will have to get out of the car. The guard will check the gold chip in everyone's badge and will also inspect the trunk.

NCERC/DAF is very strict about items that can enter the facility. Please leave all additional electronics (ALL phones, pagers, calculators, etc.), spark-producing items (lighters, matches, etc.), and extraneous metal items in your car. There will be a location for you to store your wireless car key fob, which is also not allowed in NCERC/DAF.

Bring a lunch and some snacks for breaks.

After a morning of lecture and an afternoon of experiments, we will finish the day at NCERC/DAF around 5:00 pm.

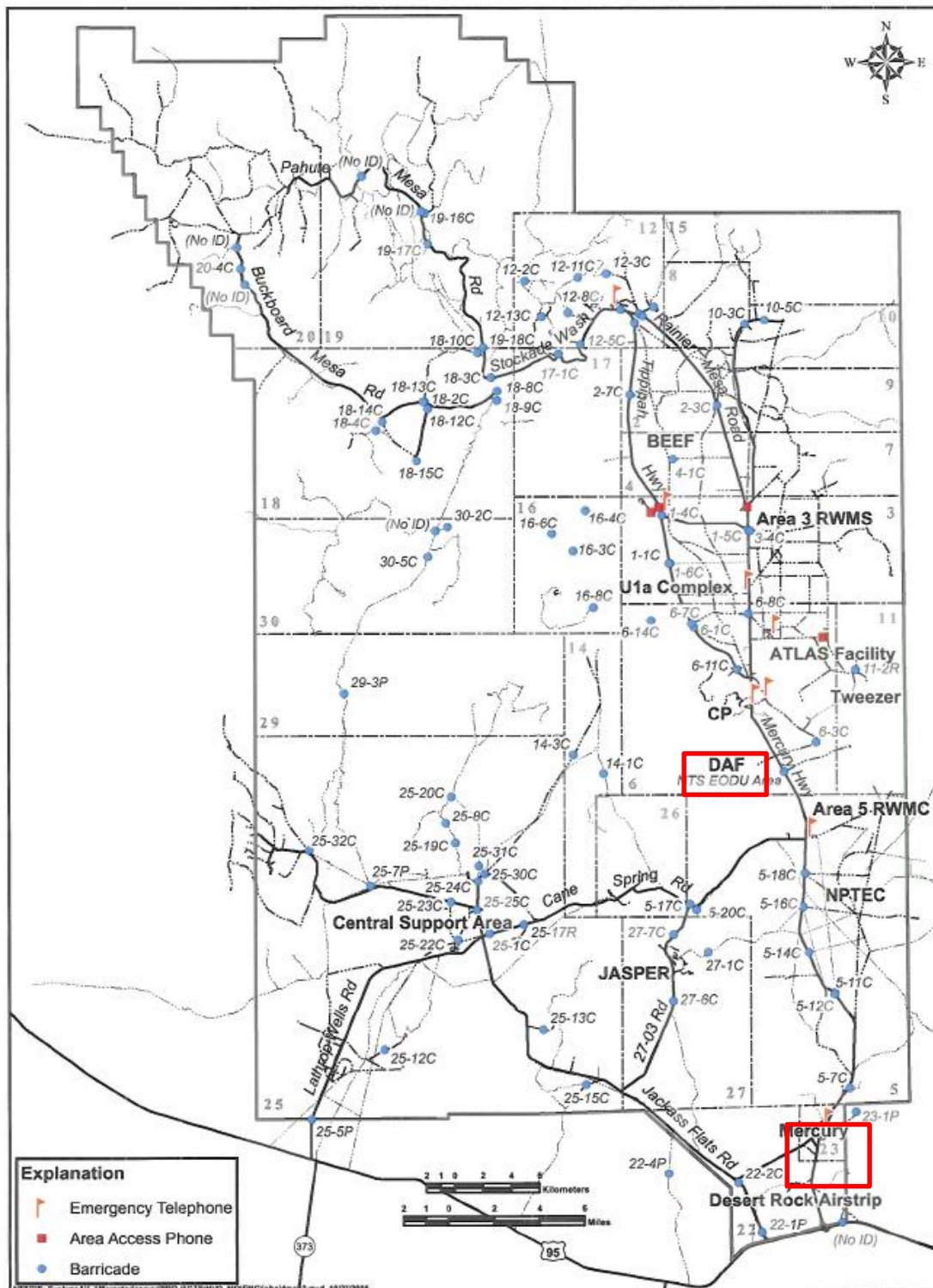
Tuesday, Wednesday, and Thursday

Experiments and lectures will be performed all day on Tuesday, Wednesday, and Thursday at the NCERC/DAF. We will meet at 7:15 am at the NCERC/DAF Entry Guard Station (EGS). You will need to leave your hotel approximately 30 minutes earlier than on Monday to make it to NCERC/DAF on time.

Friday

After a week of early mornings, Friday will be your day to sleep in (a bit!). We will be meeting in town at 8:30 at either the NATM or the NFO/NSF). Conference room location information will be given to you during the class week. Maps were previously provided above on how to get to either the NATM or the NFO/NSF. Again, you will need your badge to get into NFO/NSF, but not at the NATM.

Maps of the NNSS, NCERC/DAF and Mercury



NNSS Map
NCERC/DAF and Mercury are highlighted with red boxes.